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ABSTRACT

Research on communication in counseling has identified/defined counselor communication behaviors which may affect client response and change. To further understand the pattern of interaction between counselor and client, transcripts of four initial interviews by Albert Ellis and two by Carl Rogers were analyzed for the pattern of responding within each unique dyad. The verbal utterances of counselor and client were coded by two independent judges for personal, descriptive, cognitive, or directive communication modes. Using Shannon and Weaver's (1949) mathematical theory of communication, each interview was analyzed first for the pattern of the four communication modes regardless of the speaker, and second for the pattern of communication acknowledging the speaker. Response data without the speaker revealed consistent third-order redundancy, suggesting various communication modes were controlled by the preceding two responses. Analysis of response modes crossed with the speaker showed second-order redundancy, or response modes controlled by the other's preceding response. The ambiguity of both the counselor's and the client's responses was somewhat greater within Rogers' interviews, suggesting slightly more freedom of response. The results may reflect Ellis' rather directive style of counseling or the structuring provided by counselors in initial encounters with clients. (MCF)

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An Information Theory Analysis of Interviews by Ellis and Rogers

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An Information Theory Analysis of
Interviews by Ellis and Rogers

Abstract

The purpose of this study was to investigate the communication within the counseling of Ellis and Rogers from an interactional perspective. Rather than asking of the interactive data of the counseling dyads, "Why did the counselor and client behave the way they did?", the question was one of trying to understand the form or pattern of their responding--i.e., what it was about their dyadic "system" that caused the interaction to take on its particular form. Data for the analyses were derived from transcriptions of six initial interviews (4 by Ellis, 2 by Rogers). Analyses were based on Shannon and Weaver's (1949) mathematical theory of communication. The patterning of the communication within the interviews is presented, as is information concerning the relative control of the counselor and client on each other's responding.

An Information Theory Analysis of Interviews by Ellis and Rogers

In a general sense, "communication" may be said to occur between people whenever they behave in a non-random manner with respect to each other (Losey, 1878; Shannon & Weaver, 1949). More specifically, it means that each person's actions are dependent, at least to some degree, on the preceding behaviors of the other. By this definition, it should be understood that "communication" is not simply the response of one person to another, but rather a relationship between their responses (Cherry, 1957).

Such an "interactional" perspective on communication has currency for counseling. Indeed, were a counselor and client not to respond differentially or contingently to each other's responses, it would be difficult to say that there was any exchange/communication (much less, counseling) going on between them (Barnlund, 1981). Research on "communication" within counseling, however, has generally been "punctuated" (Watzlawick, Beavin & Jackson, 1967) such that there has been a decided focus on the effects of counselor responses on the client and relatively little attention paid to the effects of clients on counselors (see Strong & Matross, 1973). These efforts have generally been directed at identifying/defining those discrete communicative behaviors (e.g., "micro-counseling skills"--Ivey, 1971) which, when offered by the counselor, may be reasonably

expected to lead to fairly predictable types of client response (and change).

While this sort of uni-directional view of counseling communication has proven useful (particularly as the fruits of the research have been translated into counselor training programs), given the previously noted "interactive" perspective on communication, it is wanting in that it leaves a blind spot with respect to the effect of the client's responses on those of the counselor. Within the "broader perspective," not only do clients respond to counselors, but counselors also respond to clients.

The purpose of this study was to investigate the communication within the counseling of Ellis and Rogers from an interactional perspective. The focus of the study was decidedly "cybernetic" in character--cybernetics being that field of study whose focus is on the nature and extent to which systems are subject to determining and controlling factors (Ashby, 1968). To paraphrase Ashby, rather than asking of the interactive data for a counseling dyad, "Why did the counselor and client behave the way they did during their encounter?", the question became one of trying to understand the "form" or "pattern" of their responding--i.e., what it was about their particular dyadic "system" that caused it to take on its particular form. That the counselor and client would respond differentially toward each other (i.e., communicate) was taken for granted.

In that each interview analyzed in this study involved a different client, the assumption was made that the communication within each interview reflected the behavior of a unique dyadic

system, and the identification of a "Rational Emotive" or "Person-centered" pattern of counseling interaction was not anticipated.

Constraint and Pattern

At issue in the investigation of the mutual differential responding of counselors and clients toward each other is the constraint each person's responding imposes on the responding of the other, and consequently on the overall form or pattern of the interaction. The focus on constraint (in contrast to "cause") follows from a recognition that communication, in general, and counseling, in particular, are not strictly deterministic processes, but rather are better understood as probabilistic or stochastic processes. As a consequence, rather than conceptualizing communication as being governed by deterministic laws, it is more reasonable to describe it in terms of probabilistic rules. More specifically, the occurrence of any particular event in the communication process depends to a variable extent upon events preceding it; but it is not possible at any specific point in time to predict exactly what event will follow.

It is important to understand that this "dependency" only means that the occurrence of the first event alters the probability of occurrence of the second event; it does not imply that the events are strictly or "causally" determined (Penman, 1980). More simply put, the position of "probabilistic determinism" suggests that given particular stimuli, particular other behaviors may be more or less likely to occur. This uncertainty in response occurrence allows for greater behavioral

flexibility than would be possible with a fully deterministic system. At the same time, even given this response uncertainty or behavioral flexibility, the resultant interaction is not generally "random" or chaotic, but instead tends toward some type of order or patern. Communication (and by implication, counseling), therefore, can be considered as a process of constraint on the initial variability in a social system. The responses each person makes to the other function to limit or constrain the responses of the other and vice versa (Lichtenberg & Heck, in press). However, because of the probabilistic nature of the process and the flexibililty that entails, at no point is the interaction completely predictable or determined.

Closely related to the above concepts is the "informational model" of communication based upon Shannon and Weaver's (1949) mathematical theory of communication (also called "information theory" --see Attneave, 1959; Losey, 1979; Penman, 1980). The concept of information is defined by Attneave (1959) as "that which removes or reduces uncertainty" (p.1). In considering information within communicative interaction, it is helpful to think in terms of three roles: a message sender, a message receiver, and an observer. One person conveys a message to another that functions to a greater or lesser extent to reduce the observer's uncertainty. Uncertainty exists when the observer is unable to accurately predict the occurrence of some possible event or outcome (Penman, 1980). The greater the number of alternative events that are likely to occur (probable), the greater amount of uncertainty associated with the occurrence of any given event.

Since information can be considered a consequence of uncertainty reduction, then the greater the amount of uncertainty that exists about the occurrence of an event, the more information the occurrence of the event carries. "If uncertainty can be measured, then information can be taken to be simply the decrease of this measure" (Penman, 1980, p.49).

Maximum uncertainty is said to exist when each possible event has an equal likelihood of occurrence and the sequence of events prior to any given event has no effect on the predictability of the event. At the other extreme, zero uncertainty (also called 100 percent "redundancy") exists when the sequence of events is entirely predictable. Redundancy, therefore, is negatively related to the amount of information.

Method

Data

Data for the analyses were derived from verbatim transcriptions of six actual counseling/psychotherapy interviews, four of which were conducted by Dr. Albert Ellis and two by Dr. Carl Rogers. Transcripts were obtained from the American Academy of Psychotherapists Tape Library. All were initial interviews; they averaged 36 minutes in length. A general description of each of the six interviews is provided below:

1. Ellis	Client: 39 year old divorcee, angry at her submission to exploitation by her ex-husband and step-children
2. Ellis	Client: 25 year old male student,

	won't do school work unless he can do it perfectly
3. Ellis	Client: 25 year old female, condemns herself for being afraid of refusals in her job
4. Ellis	Client: 20 year old male, fears rejection by women
5. Rogers	Client: 17 year old female of low socio-economic status
6. Rogers	Client: Male: 17 year old male adolescent with vocational and family problems

The verbal utterances of the counselor and client were coded by two independent judges using Lichtenberg and Hummel's (1976) modification of Roberts' Modes of Communication (Roberts, 1968; also see Simon & Boyer, 1970). The four modes of communication were: (a) Personal (personal, affective, self-disclosing statements which focus on and share personal reactions to things impinging upon the speaker, (b) Descriptive (descriptive, impersonal, non-affective statments which, even though they may be about the speaker, evidence an objectivity or distance about them, (c) Cognitive (cognitive or analytical statements that display an integration or tying together of ideas or concepts, (d) Directive (directive, leading, structuring or otherwise imperative statements which direct the attention or behavior of the other, or which imply what the other should or should not

do). Judges were trained to a level of interrater agreement of K (kappa) = .80 on manuscripts similar to the interviews coded in this study. In actual practice the kapppa coefficient ranged from .44 - .68. Although this range presents evidence of some rater deterioration, all values of kappa were significant beyond the .001 alpha level. Rater coding disagreements on the actual interviews used in the study were settled by rerating and, when necessary, by negotiation.

Analyses

Each interview was analyzed twice: The first analysis focused on the pattern of the four modes of communication without regard to speaker. The second analysis focused on the pattern of communication while acknowledging the different speakers. The latter analysis involved a search for interactional pattern among eight categories (4 modes x 2 speakers). Although the interaction pattern among the eight categories was of particular interest, the former analysis of pattern among the communication modes was conducted to permit study of the pattern of those modes without the "overlay" of a "speaker-switching" pattern.

Consistent with the perspective and intent of this study, statistical treatment of the data consisted of application of Shannon and Weaver's (1949) mathematical theory of communication. Chi square analyses of the sequential dependencies (redundancies) among the counselor and client responses were computed to reveal the order of structure and organization of each interview (Attneave, 1959; Chatfield & Lemon, 1970; Lichtenberg & Heck, in press). Computation of the order of redundancy involved

determining the longest sequence of events of a given length which was statistically significant. Thus a sequence of events had an nth-order redundancy when the prediction of some event depended upon a knowledge of the n-1 preceding events (Attneave, 1959).

In order to determine whether successive events were independent of one another, the average amount of information (H) provided by a given response was compared with the average information provided by pairs of responses (H_2). The difference between H_2 and H is considered the average conditional uncertainty of a response given the preceding response. A similar procedure was followed in order to explore higher-order dependencies among events. For example, to determine third-order redundancy the conditional uncertainty of a response given the two prededing rsponses was computed. The difference between successive values of conditional uncertainty provided a measure of how much information was gained (or uncertainty reduced) by basing predictions for a given event on the sequence of n events. This difference score is a measure of shared information (T) which was tested for statistical significance using an approximation of the X^2 goodness-of-fit test. [For computational formulae see Attneave, 1959.]

The indices of the degree and order of redundancy for the interviews, however, could reveal nothing of the kind of lawfulness or patterning that was involved in the interviews. In order to do so, the probabilities of the various patterns of responses for the range of sequential dependency of each interview were computed. Measures of the degree to which counselors'

responses controlled those of the client, and vice versa, were also computed (see Lichtenberg & Heck, in press).

Results

Analyses of the interviews using the response modes without regard to speaker revealed a consistent 3rd-order redundancy (a patterning of three responses) in all but one interview (see Table 1). A 3rd-order redundancy suggests that the occurrence of the various modes of communication were "controlled" by the preceding two response modes. The exception to this pattern was an interview by Rogers that evidenced only 2nd-order redundancy.

Insert Table 1 about here

Based on their probabilities of occurrence, the predominant pattern(s) of communication for each of the interviews are described in Table 2.

Insert Table 2 about here

Analyses of the interviews using the response modes crossed with speaker revealed consistent 2nd-order redundancy (See Table 3). Such a pattern suggests that the response mode of each speaker was "controlled" by the immediately preceding response of the other.

Insert Table 3 about here

As above, based on their probabilities of occurrence, the predominant interactive pattern(s) of communication for each of the interviews are presented in Table 4.

Insert Table 4 about here

It is felt that caution should be exercised when interpreting these latter patterns, as such patterns, may reflect, in part, an artifact of counselor-client speaker-switching, and reveal little regarding the the communicative structure of the interviews--at least as pertains to the particular response categories (modes).

Irrespective of whether the 2nd-order redundancy in the second series of analyses was confounded by the imposition of a pattern of speaker exchanges, it was nevertheless possible to investigate the "degree" of control each speaker's responses had on the occurrence of the type of response produced by the other. In order to accomplish this the ambiguity in each speaker's response, given the prior response by the other, was determined (Attneave, 1959). Within Shannon and Weaver's (1949) mathematical theory of communication, "ambiguity" refers to the uncertainty or variability of responses selected when the preceding or "stimulus" responses are known. In a general sense, ambiguity is the reciprocal of "control": The greater the

ambiguity/uncertainty of a set of responses, given a set of stimuli, the less control those stimuli exert over the occurrence of the responses.

The ambiguity of (a) the client's response modes (given the counselor's stimulus modes), and (b) the counselor's response modes (given the client's stimulus modes) were computed for each interview (for the computational formulae, see Attneave, 1959). In a general sense, the speakers reduced the absolute ambiguity ("entropy"--see Attneave, 1959 and Shannon & Weaver, 1949) of the other speaker's responses by 1-10%. Ambiguity of both the counselor's and client's responses was somewhat greater within the Rogers interviews than in the Ellis interviews--suggesting slightly more "flexibility" or "freedom of response" (i.e., less interpersonal constraint) in the individuals' responding in the Rogers interviews (see Table 5).

Insert Table 5 about here

Comparison of the ambiguity measures for the counselor and client for the same interview allowed for determining which individual exerted the greater control (over the other's communication response modes) within the interview (refer to Table 5). [NOTE: It is inappropriate to conclude that the "controlling individual" necessarily "controls" the pattern of the interview, since that person's behavior is controlled, at least in part, by the other (see Strong & Claiborn, 1982). The interactive pattern of communication within the interview is inextricably a function of <u>both</u> interactants.]

Discussion

The application of principles of information theory to the description and study of counseling interviews is particularly well-suited for exploring issues of control, constraint, the exchange of information, and detecting patterns of interaction in the counseling relationship. The development of coding category systems which are rooted in and relevant to a strong theory-base will enable researchers to test models of individual therapy sessions and entire cases consisting of a number of interviews.

While the present study was intended to be primarily descriptive, it is evident that the "tools" of information theory were useful in identifying underlying patterns of interaction between counselors and clients. Recognizing that given the data set used in this study, contrast with interviews other than initial interviews is not possible, interpretation of the predominance of "counselor control" may be understood in terms of the "structuring" provided by counselors in initial encounters with clients (see Tracey & Ray, 1984). The results may also reflect Ellis' rather directive style of counseling. A third interpretation could be that these results are reflective of therapeutic "one-upmanship" on the part of the counselor (Haley, 1963). Additional studies that focus on these distinct (although not necessarily mutually exclusive) interpretations would be appropriate.

Another potential application of information theory analyses would be in counselor training and supervision. At a minimum, counselor trainees could become sensitized to patterns that typify

their counseling interactions through analysis of their sessions. Finally, the patterns identified through information theory analyses could be correlated with data concerning client satisfaction and other outcome measures in order to assess the effectiveness of specific approaches to therapy.

Table 1

Chi-square analyses for order of redundancy for the six counseling interviews based on 4 response modes (i.e., without regard to speaker). [SL=Sequence Length; H_n=Conditional Uncertainty; T_n=Shared Information; X^2=Chi-square approximations, and df=Degrees of Freedom.]

Interview	SL	H_n	T_n	X^2	df
1	1	1.833	.497	293.27*	9
	2	1.337	.190	112.27*	36
	3	1.147	.176	103.94	144
	4	.971	.141	83.27	576
	5	.830	.130	76.95	2304
2	1	1.717	.264	56.81*	9
	2	1.453	.224	48.05*	36
	3	1.229	.342	73.53	144
	4	.887	.269	57.71	576
	5	.619	.226	48.52	2304
3	1	1.795	.076	26.30*	9
	2	1.719	.220	76.05*	36
	3	1.499	.293	101.28	144
	4	1.206	.430	148.47	576
	5	.775	.322	111.05	2304

Table 1 (cont.)

Interview	SL	H_n	T_n	X^2	df
4	1	1.739	.238	71.51*	9
	2	1.501	.227	68.41*	36
	3	1.274	.234	70.27	144
	4	1.040	.244	73.34	576
	5	.796	.237	71.33	2304
5	1	1.845	.160	46.92*	9
	2	1.684	.211	61.66*	36
	3	1.474	.272	79.45	144
	4	1.202	.429	125.34	576
	5	.774	.348	101.85	2304
6	1	1.665	.065	23.56*	9
	2	1.600	.091	32.89	36
	3	1.509	.259	93.75	144
	4	1.250	.347	125.44	576
	5	.903	.310	112.24	2304

*$p < .05$

Table 2

Most probable response mode patterns by interview

Interview	Pattern	Probability of Occurrence
1	descriptive/directive/descriptive	.19
2	descriptive/directive/descriptive	.18
3	descriptive/analytic/descriptive	.10
4	descriptive/directive/descriptive	.11
	descriptive/analytic/descriptive	.10
5	descriptive/descriptive/descriptive	.11
6	descriptive/descriptive	.25
	analytic/descriptive	.16

Table 3

Chi-square analyses for order of redundancy for the six counseling interviews based on 8 categories (4 modes X 2 speakers). [SL=Sequence Length; $\underline{H}_n$=Conditional Uncertainty; $\underline{T}_n$=Shared Information; X^2=Chi-square approximations; and df=Degrees of Freedom.]

Interview	SL	$\underline{H}_n$	$\underline{T}_n$	X^2	df
1	1	2.159	1.017	600.31*	49
	2	1.143	.112	66.26	392
	3	1.031	.071	41.69	3139
	4	.960	.135	79.55	25088
	5	.820	.126	74.18	200704
2	1	2.276	1.067	229.32*	49
	2	1.209	.144	30.84	392
	3	1.066	.263	56.41	3139
	4	.803	.239	51.33	25088
	5	.564	.185	39.71	200704
3	1	2.520	1.036	353.24*	49
	2	1.484	.136	46.35	392
	3	1.348	.341	116.12	3139
	4	1.008	.317	107.94	25088
	5	.691	.270	93.15	200704

Table 3 (cont.)

Interview	SL	H_n	T_n	x^2	df
4	1	2.342	1.056	317.64*	49
	2	1.286	.152	45.64	392
	3	1.134	.229	68.82	3139
	4	.906	.215	64.59	25088
	5	.691	.179	53.85	200704
5	1	2.590	1.125	329.19*	49
	2	1.465	.152	44.37	392
	3	1.313	.290	84.80	3139
	4	1.023	.319	93.37	25088
	5	.704	.323	94.42	200704
6	1	2.547	1.103	399.20*	49
	2	1.443	.086	30.97	392
	3	1.358	.270	97.77	3139
	4	1.088	.327	118.46	25088
	5	.760	.280	101.17	200704

*$p < .05$

Table 4

Most probable interactive response mode pattern for the six interviews

Interview	Pattern*	Probability of Occurrence
1	Cl:descrip/Co:direct	.23
2	Co:direct/Cl:descrip	.14
3	Cl:analytic/Co:direct	.10
4	Cl:descrip/Co:direct	.12
5	Co:descrip/Cl:descrip	.11
6	Cl:descrip/Co:descrip	.13

*[Co=counselor, Cl=client]

Table 5

Response ambiguity indices for the counselor and client for each interview

Interview	Counselor	Ambiguity	
		Counselor	Client
1	Ellis	1.189*	1.100
2	Ellis	1.310*	1.111
3	Ellis	1.483*	1.482
4	Ellis	1.314*	1.254
5	Rogers	1.448	1.485*
6	Rogers	1.452*	1.431

*Interactant with the larger ambiguity index (i.e., the greater contingent response uncertainty) evidences the lesser control by the other speaker. Asterisk (*) indicates the speaker more in control in the interaction (see text).

References

Ashby, R. (1968). Introduction to cybernetics. New York: Wiley.

Attneave, F. (1959). Applications of information theory to psychology. New York: Holt.

Barnlund, D. (1981). Toward an ecology of communication. In C. Wilder & J. Weakland (Eds.), Rigor and imagination. New York: Praeger.

Chatfield, C. & Lemon, R. (1970). Analyzing sequences of behavioral events. Journal of Theoretical Biology, 29, 427-445.

Cherry, C. (1957). On human communication. Cambridge, MA: MIT Press.

Haley, J. (1963). Strategies of psychotherapy. New York: Grune & Stratton.

Ivey, A. (1971). Microcounseling. Springfield, IL: Charles Thomas.

Lichtenberg, J. & Heck, E. (in press). The analysis of pattern and sequence in process research. Journal of Counseling Psychology.

Lichtenberg, J. & Heck, E. (1985). Methodological approaches to the study of interpersonal influence on counseling interaction. Unpublished manuscript. Department of Counseling Psychology, University of Kansas, Lawrence, KS.

Lichtenberg, J. & Hummel, T. (1976). Counseling as stochastic process: Fitting a Markov chain model to initial counseling interviews. Journal of Counseling Psychology, 23, 310-315.

Losey, G. (1978). Information theory and communication. In P. Colgan (Ed.), Quantitative ethology. New York: Wiley.

Penman, R. (1980). Communication processes and relationships. New York: Academic Press.

Roberts, W. (1968). Modes of communication: A model for studying teacher-student interaction. Unpublished doctoral dissertation, Princeton University, Princeton, NJ.

Shannon, C. & Weaver, W. (1949). The mathematical theory of communication. Urbana, IL: University of Illinois Press.

Simon, A. & Boyer, E. (Eds.) (1970). Mirrors for behavior II: An anthology of observation instruments. (Vols. A & B). Philadelphia, PA: Research for Better Schools.

Strong, S. & Claiborn, C. (1982). Change through interaction. New York: Wiley.

Strong, S. & Matross, R. (1973). Change processes in counseling and psychotherapy. Journal of Counseling Psychology, 20, 25-37.

Tracey, T. & Ray, P. (1984). Stages of successful time-limited counseling: An interactional examination. Journal of Counseling Psychology, 31, 13-27.

Watzlawick, P., Beavin, J., & Jackson, D. (1967). Pragmatics of human communication. New York: Wiley.